Ordering number : EN2257B

Monolithic Linear IC





Electronic Tuning-Use FM Front End for Car Radio, Home Stereos

Overview

• The LA1177 is an FM front end IC for use in car radio, home stereo applications. It requires fewer external parts. The on-chip oscillator and oscillation buffer facilitate designing of electronic tuning sets.

Features

• Wide-band AGC circuit (Improvement in intermodulation, cross modulation characteristics).
• On-chip local oscillation buffer (For electronic tuning).

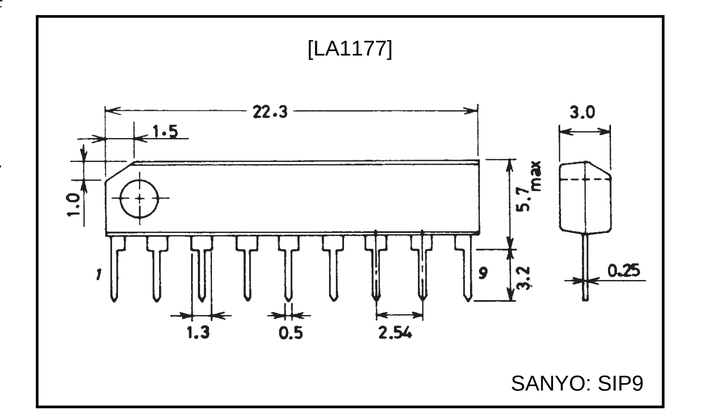
Functions

• Oscillator, oscillation buffer.
• Mixer.
• Wide-band AGC circuit.
• IF amplifier.

Package Dimensions

unit: mm

3017C-SIP9



Specifications

Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	Pins 2, 9	10	V
Allowable power dissipation	Pd max	Ta≤70°C	440	mW
Operating temperature	Topr		–20 to +70	°C
Storage temperature	Tstg		–40 to +125	°C

Operating Conditions at Ta=25°C

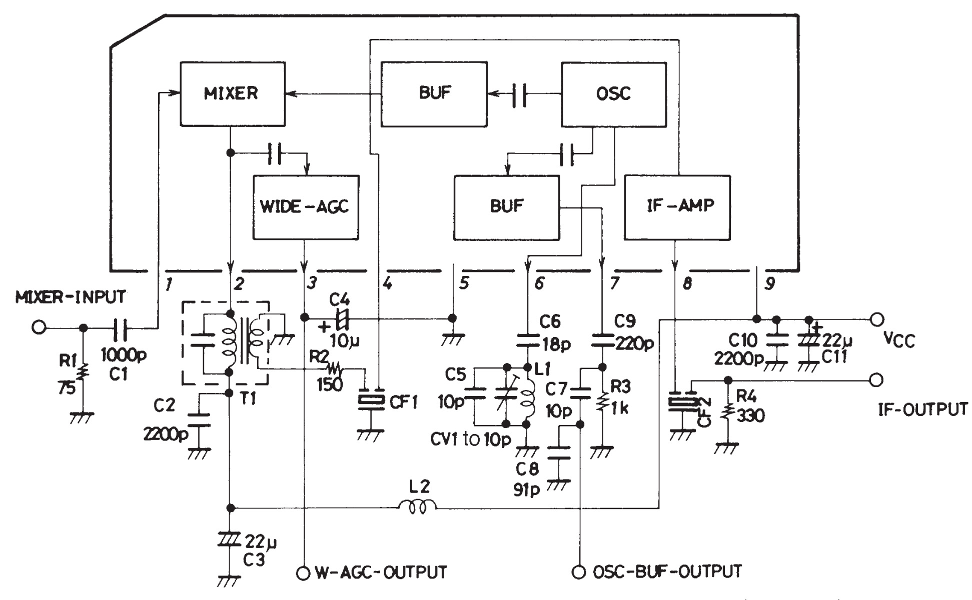
Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		8	V
Operating voltage range	V_{CC} op		8 to 9	V

Electrical Characteristics at Ta=25°C, V_{CC}=8V, fin=88MHz

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}	No input	21	26	31	mA
AGC high-level voltage	V_{AGC}-H	V_{IN}=0dBμ	7.7	8.0		V
AGC low-level voltage	V_{AGC}-L	V_{IN}=100dBμ		0.07	0.3	V
AGC mixer input voltage	$V_{i\ AGC}$	V_{AGC}≤2V, Pin 3	73	80	87	dBμ
IF saturation output voltage	V_{IF}-max	V_{IN}=1.0dBμ	108	112	116	dBμ
Input limiting voltage	$V_{i\ lim}$		76	83	90	dBμ
Voltage gain	VG	V_{IN}=65dBμ	88	92	96	dBμ
Local OSC output voltage	V_{OSC}	No input, 75Ω termination	80	84	88	dBμ

SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquarters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

Evaluation Circuit and Internal Equivalent Circuit Block Diagram



Unit (resistance : Ω, capacitance : F)

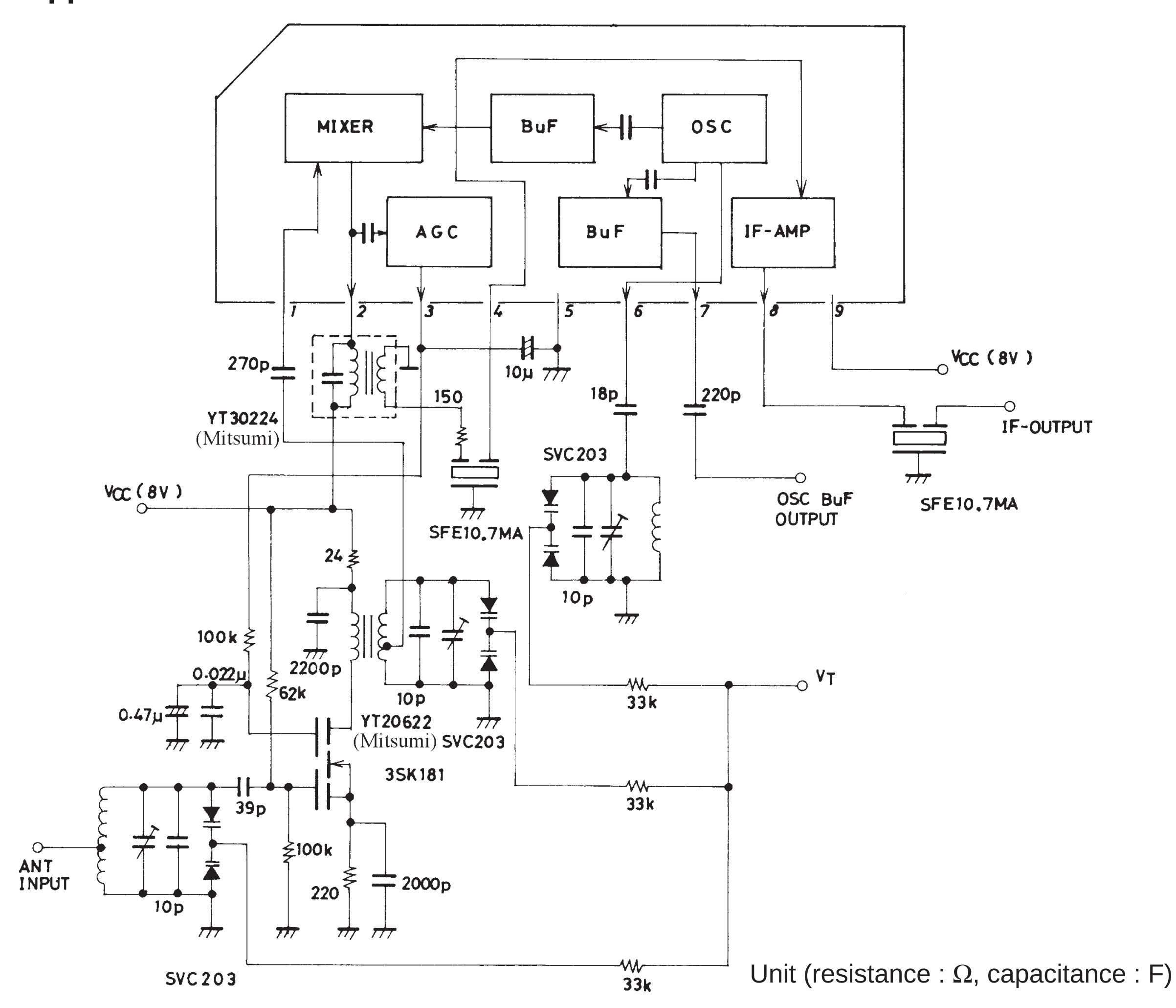
T1 : YT30224 (Mitsumi)
L1 : HU-50448 (Mitsumi)
CF1-CF2 : SFE10.7MA (Murata)

Typical Voltage on Each Pin

Pin No.	Typical voltage	Description	Remarks
1	2.7V	Mixer input	
2	8.0V	Mixer output	
3	8.0V	AGC input	No input
4	2.0V	IF input	
5	0V	GND	
6	4.9V	Oscillator base terminal	
7	1.4V	Oscillation buffer output	
8	4.4V	IF output	
9	8.0V	V_{CC}	

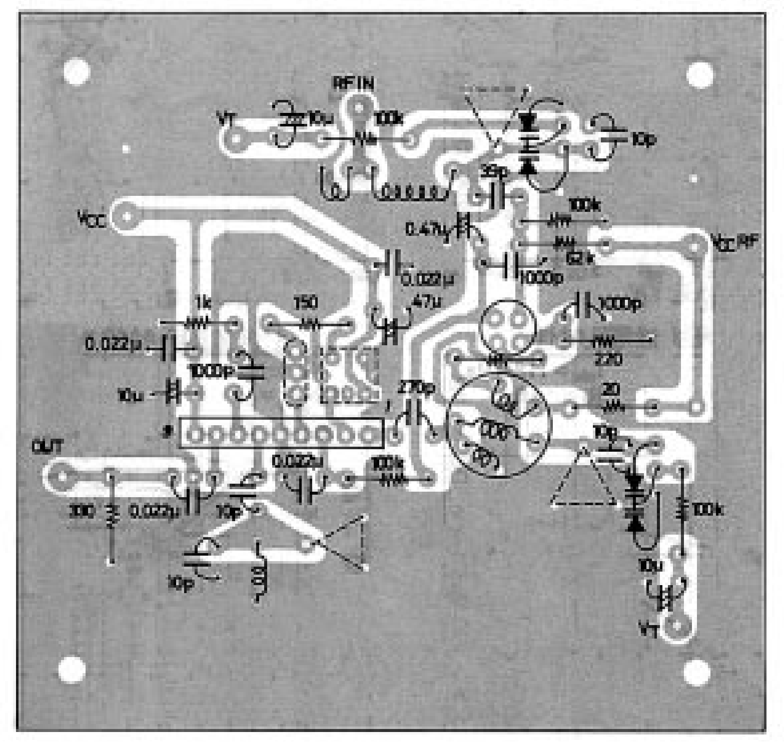
Note : Extreme caution should be exercised when applying voltage across pin 9 (+) and other pins as dielectric breakdown may occur.

Sample Application Circuit



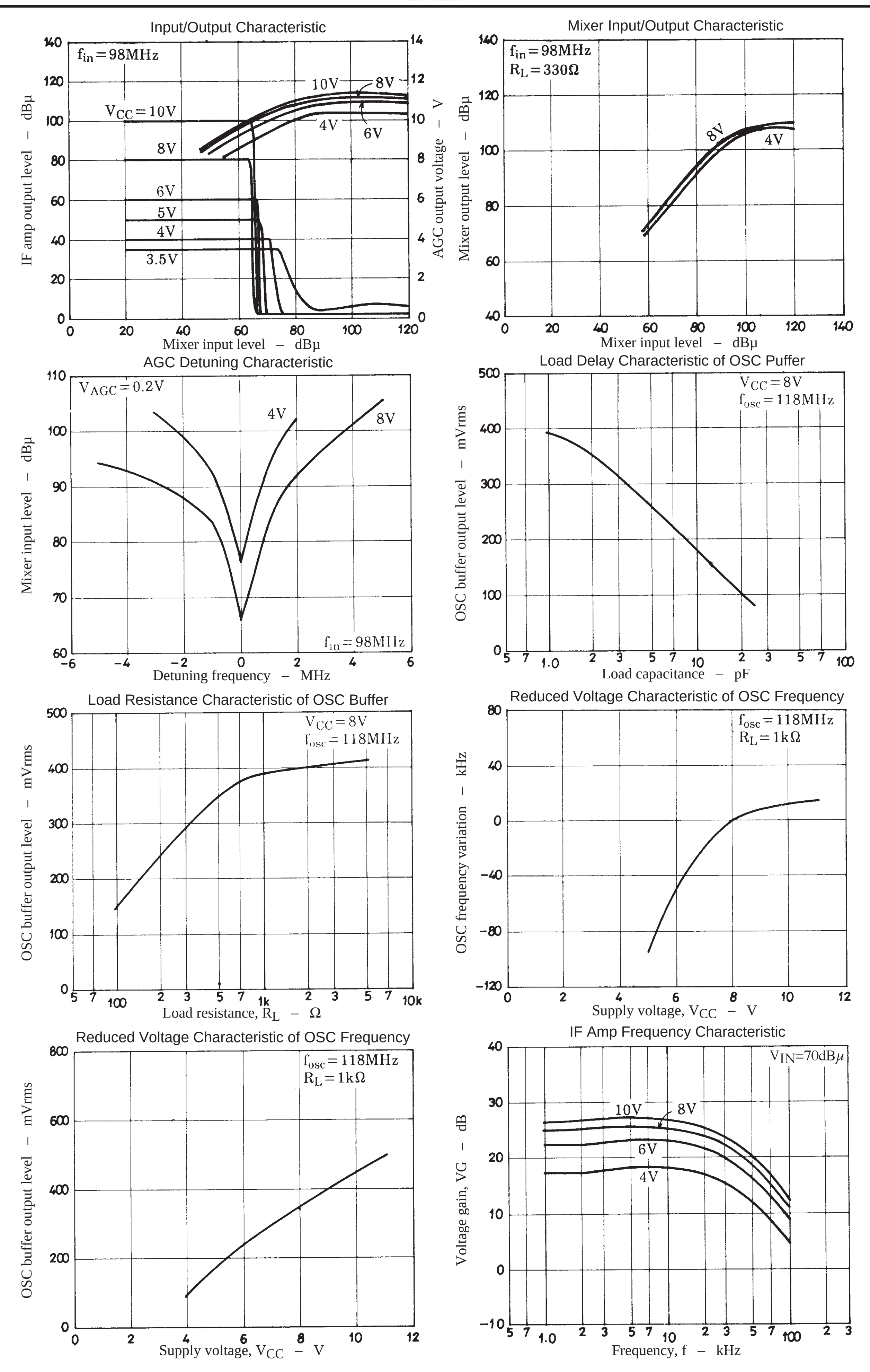
Unit (resistance : Ω, capacitance : F)

Sample Printed Circuit Pattern

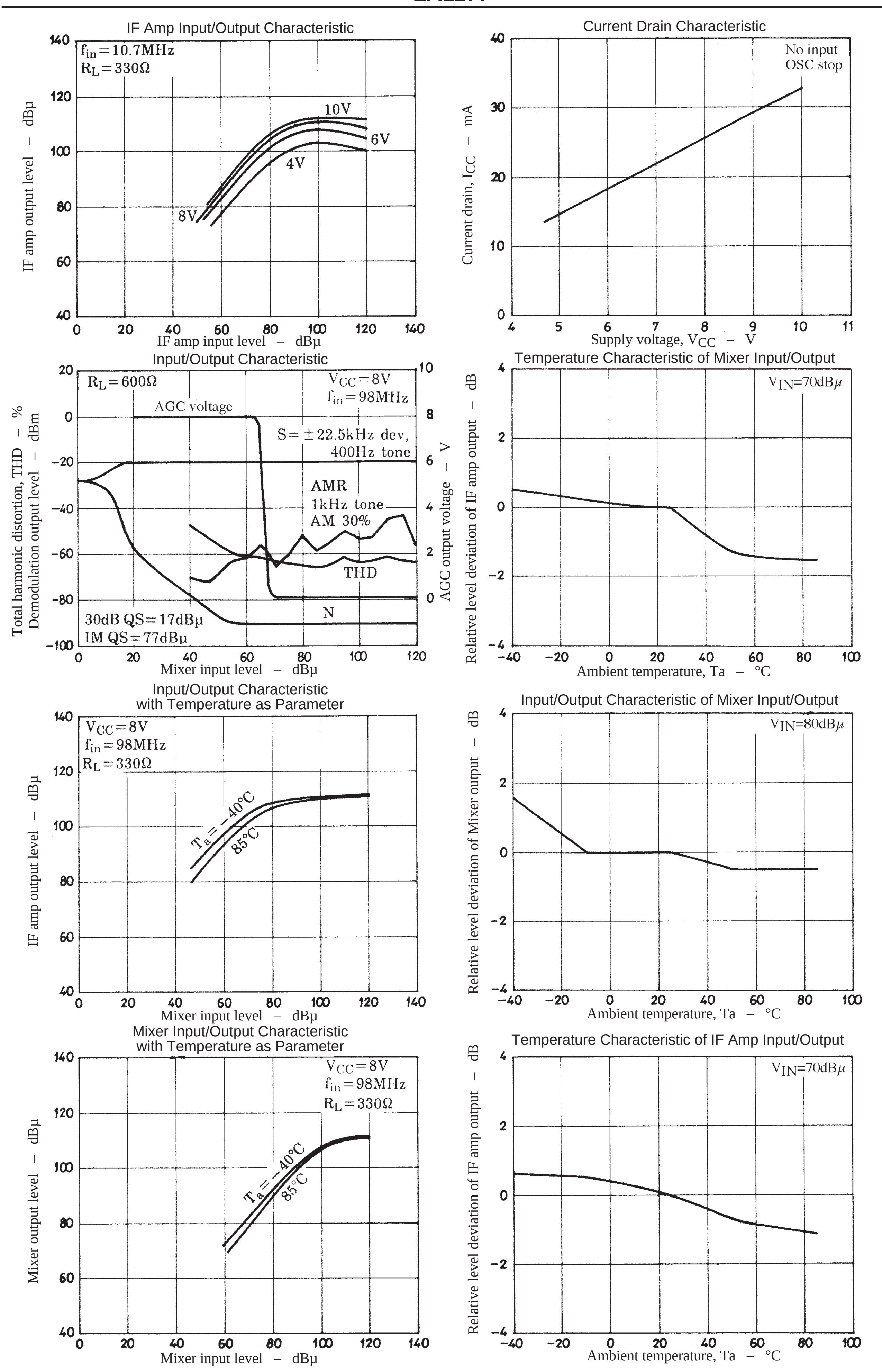


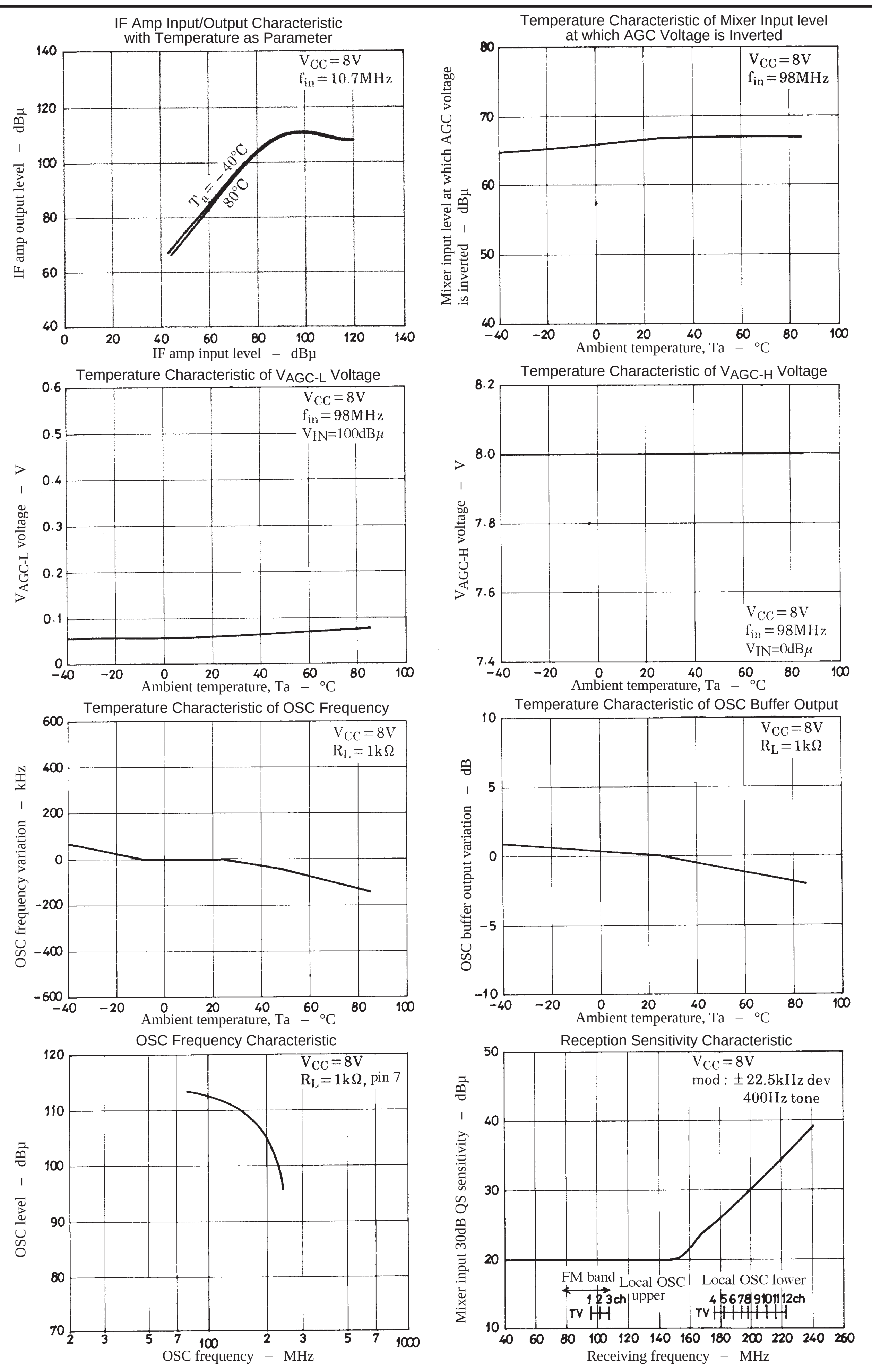
Cu-foiled area 85×82 mm^2

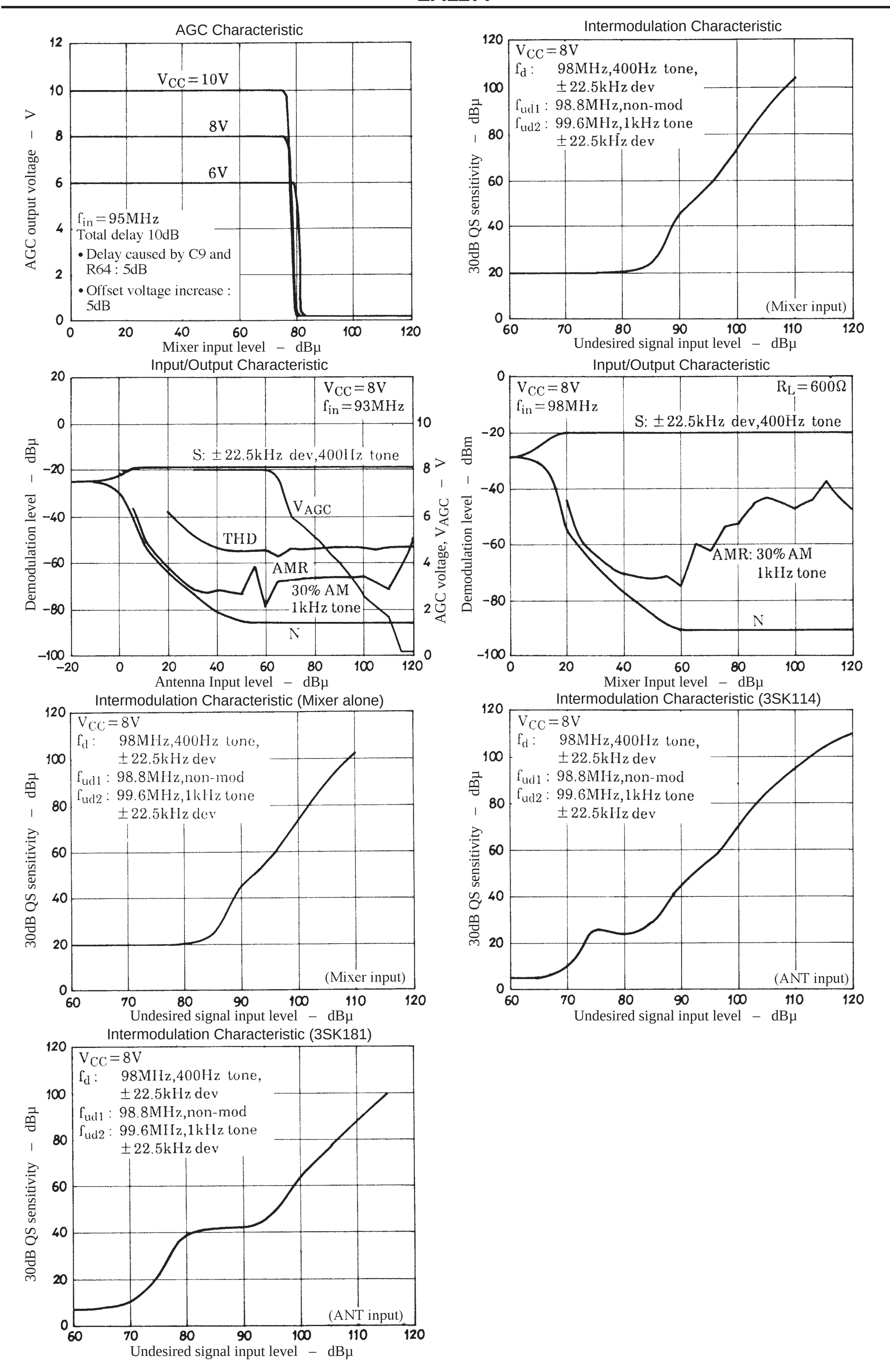
Unit (resistance : Ω, capacitance : F)



Input/Output Characteristic
fin=98MHz
VCC=10V
8V
6V
5V
4V
3.5V
10V
8V
4V
6V
IF amp output level – dBμ
AGC output voltage – V
Mixer input level – dBμ
Mixer Input/Output Characteristic
fin=98MHz
RL=330Ω
8V
4V
Mixer output level – dBμ
Mixer input level – dBμ
AGC Detuning Characteristic
VAGC=0.2V
4V
8V
fin=98MHz
Mixer input level – dBμ
Detuning frequency – MHz
Load Delay Characteristic of OSC Puffer
VCC=8V
fosc=118MHz
OSC buffer output level – mVrms
Load capacitance – pF
Load Resistance Characteristic of OSC Buffer
VCC=8V
fosc=118MHz
OSC buffer output level – mVrms
Load resistance, RL – Ω
Reduced Voltage Characteristic of OSC Frequency
fosc=118MHz
RL=1kΩ
OSC frequency variation – kHz
Supply voltage, VCC – V
Reduced Voltage Characteristic of OSC Frequency
fosc=118MHz
RL=1kΩ
OSC buffer output level – mVrms
Supply voltage, VCC – V
IF Amp Frequency Characteristic
VIN=70dBμ
10V
8V
6V
4V
Voltage gain, VG – dB
Frequency, f – kHz

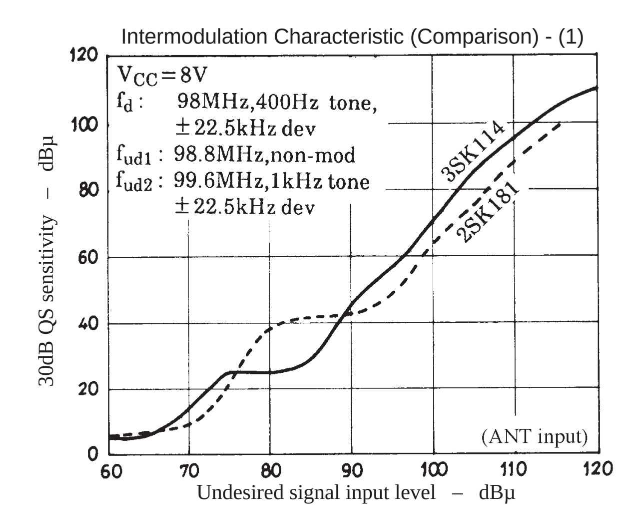

IF Amp Input/Output Characteristic
fin = 10.7MHz
RL = 330Ω
10V
6V
4V
8V
IF amp output level – dBμ
IF amp input level – dBμ
Current Drain Characteristic
No input
OSC stop
Current drain, ICC – mA
Supply voltage, VCC – V
Input/Output Characteristic
RL = 600Ω
VCC = 8V
fin = 98MHz
AGC voltage
S = ±22.5kHz dev, 400Hz tone
AMR
1kHz tone
AM 30%
THD
N
30dB QS = 17dBμ
IM QS = 77dBμ
Total harmonic distortion, THD – %
Demodulation output level – dBm
AGC output voltage – V
Mixer input level – dBμ
Temperature Characteristic of Mixer Input/Output
VIN=70dBμ
Relative level deviation of IF amp output – dB
Ambient temperature, Ta – °C
Input/Output Characteristic
with Temperature as Parameter
VCC = 8V
fin = 98MHz
RL = 330Ω
Ta = –40°C
85°C
IF amp output level – dBμ
Mixer input level – dBμ
Input/Output Characteristic of Mixer Input/Output
VIN=80dBμ
Relative level deviation of Mixer output – dB
Ambient temperature, Ta – °C
Mixer Input/Output Characteristic
with Temperature as Parameter
VCC = 8V
fin = 98MHz
RL = 330Ω
Ta = –40°C
85°C
Mixer output level – dBμ
Mixer input level – dBμ
Temperature Characteristic of IF Amp Input/Output
VIN=70dBμ
Relative level deviation of IF amp output – dB
Ambient temperature, Ta – °C


IF Amp Input/Output Characteristic with Temperature as Parameter
VCC = 8V
fin = 10.7MHz
Ta = −40°C
80°C
IF amp output level – dBμ
IF amp input level – dBμ
Temperature Characteristic of Mixer Input level at which AGC Voltage is Inverted
VCC = 8V
fin = 98MHz
Mixer input level at which AGC voltage is inverted – dBμ
Ambient temperature, Ta – °C
Temperature Characteristic of VAGC-L Voltage
VCC = 8V
fin = 98MHz
VIN=100dBμ
VAGC-L voltage – V
Ambient temperature, Ta – °C
Temperature Characteristic of VAGC-H Voltage
VCC = 8V
fin = 98MHz
VIN=0dBμ
VAGC-H voltage – V
Ambient temperature, Ta – °C
Temperature Characteristic of OSC Frequency
VCC = 8V
RL = 1kΩ
OSC frequency variation – kHz
Ambient temperature, Ta – °C
Temperature Characteristic of OSC Buffer Output
VCC = 8V
RL = 1kΩ
OSC buffer output variation – dB
Ambient temperature, Ta – °C
OSC Frequency Characteristic
VCC = 8V
RL = 1kΩ, pin 7
OSC level – dBμ
OSC frequency – MHz
Reception Sensitivity Characteristic
VCC = 8V
mod : ±22.5kHz dev
400Hz tone
FM band
Local OSC upper
Local OSC lower
1 2 3ch
4 5 6 7 8 9 10 11 12ch
TV
Mixer input 30dB QS sensitivity – dBμ
Receiving frequency – MHz

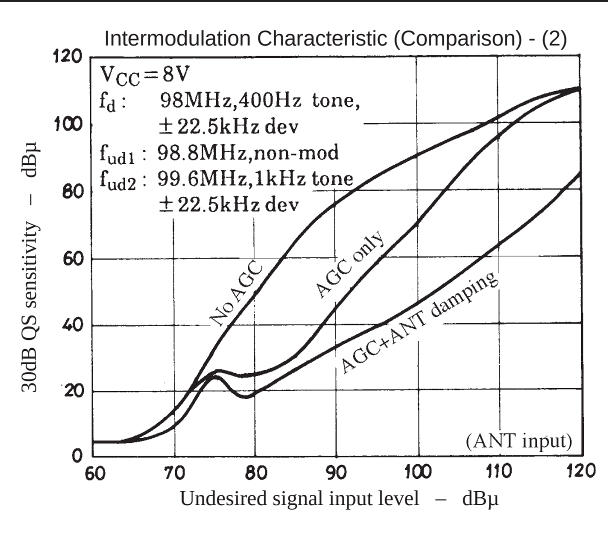


AGC Characteristic
AGC output voltage – V
Mixer input level – dBμ
VCC=10V
8V
6V
fin=95MHz
Total delay 10dB
• Delay caused by C9 and R64 : 5dB
• Offset voltage increase : 5dB
Intermodulation Characteristic
30dB QS sensitivity – dBμ
Undesired signal input level – dBμ
VCC=8V
fd : 98MHz,400Hz tone, ±22.5kHz dev
fud1 : 98.8MHz,non-mod
fud2 : 99.6MHz,1kHz tone ±22.5kHz dev
(Mixer input)
Input/Output Characteristic
Demodulation level – dBμ
AGC voltage, VAGC – V
Antenna Input level – dBμ
VCC=8V
fin=93MHz
S: ±22.5kHz dev,400Hz tone
VAGC
THD
AMR
30% AM 1kHz tone
N
Input/Output Characteristic
Demodulation level – dBm
Mixer Input level – dBμ
VCC=8V
fin=98MHz
RL=600Ω
S: ±22.5kHz dev,400Hz tone
AMR: 30% AM 1kHz tone
N
Intermodulation Characteristic (Mixer alone)
30dB QS sensitivity – dBμ
Undesired signal input level – dBμ
VCC=8V
fd : 98MHz,400Hz tone, ±22.5kHz dev
fud1 : 98.8MHz,non-mod
fud2 : 99.6MHz,1kHz tone ±22.5kHz dev
(Mixer input)
Intermodulation Characteristic (3SK114)
30dB QS sensitivity – dBμ
Undesired signal input level – dBμ
VCC=8V
fd : 98MHz,400Hz tone, ±22.5kHz dev
fud1 : 98.8MHz,non-mod
fud2 : 99.6MHz,1kHz tone ±22.5kHz dev
(ANT input)
Intermodulation Characteristic (3SK181)
30dB QS sensitivity – dBμ
Undesired signal input level – dBμ
VCC=8V
fd : 98MHz,400Hz tone, ±22.5kHz dev
fud1 : 98.8MHz,non-mod
fud2 : 99.6MHz,1kHz tone ±22.5kHz dev
(ANT input)

Intermodulation Characteristic (Comparison) - (1)



Intermodulation Characteristic (Comparison) - (2)



This catalog provides information as of September, 1997. Specifications and information herein are subject to change without notice.